REMARKS

This communication is submitted in response to the Office Action of January 30, 2004.

Claims 1-44 are pending in the subject application with claims 3, 5, 11, 17, 19, 23, 26-28, 32, 34-38 and 41-44 having been amended. Claims 1, 2, 4, 6-10, 12-16, 18, 20-22, 24, 25, 29-31, 33, 39 and 40 have not been changed relative to their immediate prior version.

The amendments to the claims are clearly supported by the specification as originally filed and do not introduce any new matter.

Reconsideration of the subject application is respectfully requested in view of the foregoing amendments and the following remarks.

The first Supplemental Information Disclosure Statement filed August 29, 2002 was considered by the Examiner as failing to comply with 37 C.F.R. §1.98(a)(2), which requires a legible copy of each U.S. and foreign patent to be provided. In this regard, it is noted that U.S. Patent No. 5,451,169 was listed on the first Supplemental Information Disclosure Statement in error and should have been listed as U.S. Patent No. 5,451,163. A Third Supplemental Information Disclosure Statement is submitted herewith listing and providing copies of U.S. Patent No. 5,451,163 and the Dempster and Lund articles incorporated by reference on page 15 of the specification. The Third Supplemental Information Disclosure Statement is accompanied by the requisite fee and is in compliance with 37 C.F.R. §1.98. Accordingly, all references listed on the Third Supplemental Information Disclosure Statement should be considered and made of record by the Examiner.

Claim 19 stands rejected under 35 U.S.C. §112, 1st paragraph, as failing to

comply with the enablement requirement with respect to the feature of the semantic space being derived from latent semantic analysis using a latent semantic analysis algorithm. Although the rejection of claim 19 is believed to be improper, claim 19 has been amended to overcome the rejection. Claim 19, as amended, recites the feature of the semantic space being derived from latent semantic analysis and this feature is clearly set forth in the specification as originally filed. Accordingly, the rejection of claim 19 under 35 U.S.C. §112, 1st paragraph, should be withdrawn.

Claims 20 and 21 stand rejected under 35 U.S.C. §112, 1st paragraph, as failing to comply with the enablement requirement with respect to the features of the semantic space being derived from HAL (claim 20) and the semantic space being derived from EM (claim 21). The rejections of claims 20 and 21 are submitted to be improper as derivation of a semantic space from HAL and from EM is respectively enabled by the Dempster and Lund articles cited and incorporated by reference in the specification. Copies of the Dempster and Lund articles are submitted herewith in the Supplemental Information Disclosure Statement. Since the specification as originally filed describes derivation of a semantic space from HAL and from EM in such a way as to enable one skilled in the art to make and/or use the claimed invention, the rejections of claims 20 and 21 under 35 U.S.C. §112, 1st paragraph, should be withdrawn. It is noted that the Lund article provides a general discussion of semantic spaces which would assist the Examiner in understanding the characteristics of a semantic space and the differences between the claimed invention and the prior art cited and applied by the Examiner.

Claim 3 stands rejected under 35 U.S.C. §112, 2nd paragraph for containing the phrase "such as" considered indefinite by the Examiner. Claim 3 has been

amended to delete the phrase "such as", and the rejection of claim 3 under 35 U.S.C. §112, 2nd paragraph, should be withdrawn.

Claims 20 and 21 stand rejected under 35 U.S.C. §112, 2nd paragraph, for the reason that the recited limitations of "HAL" and "EM" are considered by the Examiner to lack a clear definition in the specification. As pointed out above, the features pertaining to HAL and EM are respectively disclosed in the Dempster and Lund articles incorporated by reference in the specification. The rejections of claims 20 and 21 under 35 U.S.C. §112, 2nd paragraph, should therefore be withdrawn.

Claims 5-17, 26-36, 38 and 41-44 were indicated as being allowable if rewritten to overcome the rejections under 35 U.S.C. §112, 2nd paragraph, and to include all of the limitations of the base claim and any intervening claims. It is noted that no rejections under 35 U.S.C. §112, 2nd paragraph, are associated with claims 5-17, 26-36, 38 and 41-44, with their base claims or with any of their intervening claims. Since claims 5, 11, 17, 26, 27, 28, 34, 35, 36, 38, 41, 42 and 44 have each been amended to be rewritten in independent form to include all of the limitations of the base claims and any intervening claims, claims 5, 11, 17, 26-28, 34-36, 38, 41, 42 and 44 should now be allowable along with dependent claims 6-10, 12-16, 29-33, 39, 40 and 43.

The rejection of claims 1-4, 18, 19, 22-25, 37, 39 and 40 as being unpatentable over Fontana et al in view of Berman is respectfully traversed for the following reasons.

The present invention involves an automated, computer-based reading tutoring system and method involving a plurality of instructional passages of different predetermined levels of reading difficulty, submission of a student-prepared

summary of one of the instructional passages, a semantic space method or module which receives the student-prepared summary and relates its component words to data produced by a machine-learning method or algorithm (such as LSA, HAL or EM) used to infer information about the qualities of the student-prepared summary by which the student-prepared summary is evaluated for conceptual similarity with the instructional passage, and immediate feedback data including an indicator reflective of the congruence of the student-prepared summary with the instructional passage and the identity of which instructional passage the student should read next. The machine-learning method or algorithm learns associative relations between individual words and the meaning-bearing contexts in which they occur. The evaluation of the student-prepared summary performed with the present invention goes beyond operations that merely search for the occurrence of predetermined key words or phrases in user-constructed responses. The evaluation performed with the present invention considers the meaning-bearing contexts associated with the student-prepared summary and the instructional passage whereas an evaluation based on matching key words or phrases does not consider such meaning-bearing contexts. The present invention overcomes the unreliability associated with key word matching between a user-constructed response and a model response, which does not consider the overall conceptual similarity or similarity of meaning between the user-constructed response and the model response.

Independent claim 1 recites "at least one domain of discourse accessible by a student via a computer system, said at least one domain of discourse including a plurality of instructional passages of different, predetermined levels of reading

difficulty ...; semantic space method means for receiving a summary prepared by the student and submitted via the computer system of one of said instructional passages read by the student, said semantic space method means being adapted to automatically evaluate the summary for congruence with said one of said instructional passages and to automatically determine which of said instructional passages from said domain of discourse the student should read next based on the congruence of the summary with said one of said instructional passages; and immediate feedback data capable of being provided to the student via the computer system and including an indicator reflective of the congruence of the summary with said one of said instructional passages and including the identity of which of said instructional passages the student should read next." As discussed below, neither Fontana et al nor Berman teach or suggest either a domain of discourse including a plurality of instructional passages of different predetermined levels of reading difficulty, a semantic space method means for receiving a student prepared summary of an instructional passage, for automatically evaluating the summary for congruence with the instructional passage and for automatically determining which instructional passage the student should read next based on the congruence of the summary with the instructional passage, or immediate feedback data including an indicator reflective of the congruence of the summary with the instructional passage and including the identity of the instructional passage the student should read next.

Fontana et al discloses a system for teaching thinking skills and is not related to reading tutoring. The system of Fontana et al operates on the assumption that the user is capable of reading and understanding a source content presented to the user. The system of Fontana et al includes a plurality of source contents, i.e. text,

graphics, pictures, audio, etcetera, which may be selected by the user. The user investigates a selected source content using pre-programmed prompts associated with a particular thinking skill selected by the user. The prompts are pre-programmed questions and examples which lead the user to understand the thinking skill and how to apply it. Accessing a prompt may result in retrieval and display of a clarification for the prompt providing further explanation and/or examples of the prompt. No means whatsoever is provided for the user to submit responses to the prompts or to have responses to the prompts evaluated by the system. Since the system of Fontana et al is not designed to receive or evaluate any user-prepared responses, the system also does not provide any feedback data reflective of an evaluation performed on a user-prepared response. One of the thinking skills taught by the system of Fontana et al is evaluation of the source content; however, the system itself does not perform any evaluation of a student-prepared response. The system of Fontana et al is capable of recommending additional source contents for the user, but the recommendation bears no relation to the results of an evaluation performed by the system on a student-prepared response.

The Examiner acknowledges that Fontana et al does not disclose a plurality of instructional passages of different predetermined levels of reading difficulty but asserts it would have been obvious to modify the system of Fontana et al to include a plurality of instructional passages of different predetermined levels of reading difficulty. Since Fontana et al is not related to reading tutoring and operates under the assumption that the user does not possess any reading deficiencies, the Examiner's assertion of obviousness with respect to modifying Fontana et al to include instructional passages of different predetermined levels of reading difficulty

constitutes a clear departure from the essence of Fontana et al and can only be based on impermissible hindsight. Even if it can be considered obvious to modify the system of Fontana et al to include a plurality of instructional passages of different predetermined levels of reading difficulty, there are no teachings or suggestions provided by Fontana et al of a semantic space method means or of immediate feedback data for a plurality of instructional passages of the same level of difficulty, much less a plurality of instructional passages of different predetermined levels of difficulty.

The Examiner acknowledges that the system of Fontana et al does not receive a student-prepared summary of an instructional passage but asserts it would have been obvious to modify Fontana et al to perform this feature. The Examiner's assertion is improper since, as pointed out above, the system of Fontana et al is not even capable of receiving any student-prepared responses to the guiding prompts or questions, much less a student-prepared summary. Fontana et al fails to provide any motivation for any means for implementing the modification proposed by the Examiner, which requires the addition of a feature not even contemplated by Fontana et al.

Even if it can be considered obvious to modify Fontana et al to receive a student-prepared summary, there are no teachings or suggestions whatsoever by Fontana et al of any means whatsoever, much less semantic space method means, to automatically evaluate a student-prepared summary for congruence with an instructional passage and to automatically determine which instructional passage the student should read next based on the congruence of the summary with the instructional passage. As noted above, the system of Fontana et al is not designed

to receive any student-prepared responses and it follows that the system of Fontana et al is without any means to automatically evaluate a student-prepared response for congruence with an instructional passage and to automatically determine the next instructional passage based on this congruence.

The Examiner considers the guiding prompts and next area suggestions of Fontana et al as corresponding to the immediate feedback data recited in claim 1. However, the guiding prompts and next area suggestions of Fontana et al do not include an indicator reflective of the congruence of a student-prepared summary with an instructional passage as is required for the feedback data recited in claim 1. As noted above, the system of Fontana et al is not designed to receive a user-prepared response and is not designed to provide any feedback pertaining to a user-prepared response.

The deficiencies of Fontana et al are not rectified by Berman. Berman relates to a learning system for evaluating knowledge acquisition and capable of receiving narrow learner-constructed response in response to specific preprogrammed questions. The learner-constructed response is compared with predefined expected responses to the questions, as opposed to the instructional passage itself, to determine whether the learner should proceed to another question or should be offered remedial feedback. The evaluation is performed by analyzing the learner-constructed response for the presence of key words and phrases found in the predefined expected responses.

Like Fontana et al, Berman is not designed with instructional passages of different predetermined levels of reading difficulty and provides no motivation for instructional passages of different predetermined levels of reading difficulty in

absence of hindsight reconstruction. Even if it can be considered obvious to modify Berman to include instructional passages of different predetermined levels of reading difficulty, Berman like Fontana et al has no teachings or suggestions whatsoever of semantic space method means or of immediate feedback data for a plurality of instructional passages of the same level of difficulty much less a plurality of instructional passages of different predetermined levels of difficulty.

Berman like Fontana et al is not designed to receive a student-prepared summary. The questions presented by the learning system of Berman involve multiple choice or fill in the blank questions (Fig. 2c) intended to elicit narrow and specific learner-constructed responses and not a student-prepared summary of an instructional passage. As pointed out above, the system of Berman evaluates the learner-constructed responses for the presence of key words and/or phrases appearing in the predefined expected responses and this evaluation is not the same as the semantic space method means recited in claim 1. The semantic space method means considers the similarity of meaning of words and passages based on the context in which they occur and the evaluation based on key words and/or phrases is unrelated to meaning-bearing context. In addition, the learner-constructed responses in the Berman system are evaluated with respect to model answers to the preprogrammed questions and are not evaluated for congruence with the instructional passage itself, as is required for the semantic space method means recited in claim 1. It follows that the Berman learning system does not provide immediate feedback data including an indicator reflective of the congruence of a student-prepared summary with an instructional passage, as opposed to an indicator reflective of a right or wrong answer to a specific question.

In light of the above, it is seen that Berman provides no teachings or suggestions whatsoever from which the system of Fontana et al can be modified to obtain the claimed invention. The prior art fails to provide any motivation for modifying the system of Fontana et al as asserted by the Examiner and fails to provide any teachings or suggestions of the technical methodology by which Fontana et al can be modified to obtain the claimed invention. Accordingly, independent claim 1 is submitted to be clearly patentable over Fontana et al in view of Berman and should be allowed along with dependent claims 2-4.

Dependent claim 2 recites "one or more semantic spaces produced by a machine-learning method and wherein said semantic space method means includes one or more semantic space algorithms operating on said one or more semantic spaces." The Examiner relies on Berman as disclosing the recited semantic spaces and the one or more semantic space algorithms operating on the one or more semantic spaces. The model answers to the questions and the key words and phrases derived therefrom as disclosed by Berman are not the same as one or more semantic spaces since they bear no relation to the meaning of particular words or phrases. In addition, the key word evaluation scheme of Berman is not produced by a machine-learning method but, rather, is explicitly disclosed by Berman as being created by the authors of the system. Berman also does not disclose one or more semantic space algorithms operating on one or more semantic spaces, and a semantic space algorithm is not inherent to the system of Berman. Accordingly, dependent claim 2 is submitted to be clearly patentable over Fontana et al in view of Berman for the additional limitations recited therein as well as being allowable with claim 1.

Dependent claim 3 recites the machine-learning method as including "a machine learning algorithm incorporating latent semantic analysis". contrary to the Examiner's assertion, the methodology described in Berman is not equivalent to latent semantic analysis as understood by one skilled in the art to which the invention pertains. It is submitted that claim 3 is clearly patentable over Fontana et al in view of Berman for the additional limitations recited therein as well as being allowable with claim 2.

Independent claim 18 recites "a plurality of instructional passages of different, predetermined levels of reading difficulty ... ; a semantic space derived from a machine learning method; a semantic space module for receiving a summary prepared by the student ... of one of said instructional passages read by the student, said semantic space module operating on said semantic space to automatically evaluate the summary for congruence with said one of said instructional passages and to automatically determine which of said instructional passages ... the student should read next based on the congruence of the summary with said one of said instructional passages; and immediate feedback data ... including an indicator reflective of the congruence of the summary with said one of said instructional passages".

As pointed out above, neither Fontana et al nor Berman teach or suggest a plurality of instructional passages of different predetermined levels difficulty, a semantic space derived from a machine learning method, a semantic space module for receiving a summary of an instructional passage prepared by the student and operating on the semantic space to automatically evaluate the summary for congruence with the instructional passage and to automatically determine which

instructional passage itself the student should read next based on the congruence, or immediate feedback data including an indicator reflective of the congruence of the summary with the instructional passage. The rejection of independent claim 18 as being unpatentable over Fontana et al in view of Berman can only be based on impermissible hindsight and by supplying teachings not found in the references themselves. Accordingly, independent claim 18 is submitted to be patentable over Fontana et al in view of Berman and should be allowed along with dependent claims 19-22.

Dependent claims 19-21 respectively recite specific machine learning methods from which the semantic space is derived. As pointed out above, Berman does not disclose a semantic space derived from a machine learning method much less the particular machine learning methods recited in claims 19-21. Accordingly, claims 19-21 are submitted to be clearly patentable over Fontana et al in view of Berman for the additional limitations recited therein as well as being allowable with independent claim 18.

Dependent claim 22 recites the semantic space module as including "a semantic space algorithm operating on said semantic space". As explained above, the key word evaluation scheme disclosed by Berman is not equivalent to a semantic space and does not inherently include a semantic space algorithm operating on a semantic space. The key word evaluation scheme of Berman does not consider the meanings of words and passages and the context in which they occur as does a semantic space derived from a machine learning method. Accordingly, claim 22 is submitted to be clearly patentable over Fontana et al in view of Berman for the additional limitations recited therein as well as being allowable

with independent claim 18.

Independent claim 23 recites the steps of "providing a domain of discourse ... including a plurality of instructional passages of different, predetermined levels of reading difficulty; ... receiving a summary of the selected instructional passage prepared by the student ... ; automatically evaluating the summary for congruence with the selected instructional passage to obtain a measure of the student's reading comprehension; automatically selecting an instructional passage from the domain of discourse that the student should optimally read next based on the measure of the student's reading comprehension; communicating feedback data ... including an indicator reflective of the student's reading comprehension and the identity of the instructional passage that the student should optimally read next; and repeating said receiving, said automatically evaluating, said automatically selecting and said communicating steps for the instructional passage that the student reads next." As explained above, Fontana et al does not provide a plurality of instructional passages of different, predetermined levels of reading difficulty. Fontana et al is not related to reading tutoring and there would have been no motivation to modify Fontana et al to include a plurality of instructional passages of different predetermined levels of reading difficulty. Like Fontana et al, Berman does not disclose or suggest the provision of a plurality of instructional passages of different predetermined levels of reading difficulty. Neither Fontana et al nor Berman discloses a system capable of receiving a summary of a selected instructional passage prepared by a student and neither discloses a system capable of automatically evaluating a student-prepared summary of an instructional passage for congruence with the instructional passage itself to obtain a measure of the student's reading comprehension. As discussed

above, Fontana et al provides no means whatsoever by which a user can submit a user-constructed response to the system. The system of Berman receives a user-constructed response in the form of an answer to a specific multiple choice or fill in the blank question, but is not capable of receiving a student-prepared summary of an instructional passage. Fontana et al performs no evaluation whatsoever with respect to a user-constructed response. The evaluation performed by Berman is limited to a key word evaluation between a student-constructed answer to a question and predefined expected answers. Berman discloses no means whatsoever by which the step of automatically evaluating a student-prepared summary for congruence with the instructional passage itself may be performed to obtain a measure of the student's reading comprehension. The steps of automatically selecting and communicating feedback data are also not disclosed by Fontana et al or Berman. The presentation of next area suggestions by the system of Fontana et al is not based on any measure of the user's reading comprehension. In the system of Berman, an instructional passage from the domain of discourse that the student should optimally read next is not automatically selected based on a measure of the student's reading comprehension, and the feedback data communicated to the student by the system of Berman does not include an indicator reflective of the student's reading comprehension. Accordingly, independent claim 23 is submitted to be clearly patentable over Fontana et al in view of Berman and should be allowed along with dependent claims 24 and 25.

Dependent claim 25 recites the step of automatically evaluating and the step of automatically selecting as being performed "using semantic space algorithms". Neither Fontana et al nor Berman literally or inherently disclose steps of

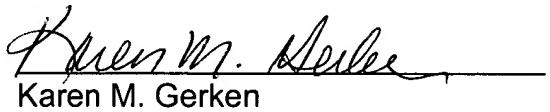
automatically evaluating and automatically selecting performed using semantic space algorithms. Accordingly, dependent claim 25 is submitted to be clearly patentable over Fontana et al in view of Berman for the additional limitations recited therein as well as being allowable with independent claim 23.

Independent claim 37 recites the steps of "viewing a selected instructional passage from a domain of discourse, including a plurality of instructional passages of different, predetermined levels of reading difficulty ... ; ... preparing a summary of the selected instructional passage; ... submitting the summary to the reading tutoring system ... ; receiving immediate feedback data ... including an indicator reflective of the congruence of the summary with the selected instructional passage and including the identity of one or more recommended instructional passages .. that should be read next based on the congruence of a summary with the selected instructional passage". The method recited in claim 37 is incapable of being performed using the systems disclosed by Fontana et al and Berman, considered singly or in any reasonable combination. Neither Fontana et al nor Berman discloses system components designed to allow the user to submit a summary via the computer system. The system of Fontana et al is not designed to permit submission of a user-constructed response at all, while the system of Berman is limited to submission of a user-constructed answer to a specific multiple choice of fill in the blank question which is not the same as submission of a summary of an instructional passage. The system of Berman does not evaluate the student-constructed responses in relation to an instructional passage but rather in comparison to predefined expected answers to the questions. Accordingly, Berman does not and cannot teach the step of receiving which involves an indicator reflective

of the congruence of a summary in relation to a selected instructional passage and including the identity of one or more recommended instructional passages that should be read next based on the congruence of the summary with the selected instructional passage. Accordingly, it is submitted that independent claim 37 is clearly patentable over Fontana et al in view of Berman and should be allowed along with dependent claims 39 and 40.

In light of the above, all of the claims in the subject application are considered to be in condition for allowance. Action in conformance therewith is courteously solicited. Should any issues in the subject application remain unresolved, the Examiner is encouraged to contact the undersigned attorney.

Respectfully submitted,



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